DISPLAY PANEL AND DISPLAY APPARATUS HAVING THE SAME

FIELD OF THE INVENTION

Embodiments of the present invention relate to a field of display technology, in particular, to a display panel and a display apparatus having the display panel.

BACKGROUND

Flat panel displays are currently the most popular display. Among the flat panel displays, active matrix organic light emitting diode (AMOLED) display apparatus has been widely used in electronic products such as computer screen, mobile phone and so on, due to its characteristics such as light and thin outline, saving electricity, no irradiation and so on.

AMOLED display panel mainly comprises an array substrate, a chip on film (COF), and a printed circuit board (PCB). The array substrate comprises a display region used to perform displaying and a connection region (that is, Fan Out) located at the periphery of the display region. End heads of leads in the display region are located in the connection region. Leads and a chip are disposed on one side of the COF, and the leads of the connection region of the array substrate are connected to the PCB by these leads and chip.

As illustrated in FIG. **1**, preparing a conventional AMOLED display panel comprises: firstly attaching a surface of the COF **200** disposed with a chip **201** on the connection region **400** of the array substrate **100**, wherein the connection region **400** is formed at the segment difference between the array substrate **100** and an package layer **101**; then attaching the other end of the surface of the COF **200** on the PCB **300**; subsequently folding the COF **200** by 180°, so that the PCB **300** is disposed on the back side of the array substrate **100** (i.e. the side which does not emit light), at this time, the chip **201** on the COF **200** is disposed towards a side away from the array substrate **100**. When assembling the display panel, it is required to not only guarantee the occupation space of the COF **200**, but also guarantee the safety of the chip **201** on the COF **200**, since the chip **201** should not be pressured and should not contact metal. Since the existence of the folding region of the COF **200**, the frame of the display apparatus has to leave enough space, to place not only the COF **200** but also a glue frame and an iron frame, so that it causes the frame of the display apparatus to be too wide; meanwhile, a distance between the PCB **300** and the array substrate **100** should be at least equal to the diameter of the folding region of the COF **200**, so the PCB **300** may not be disposed close to the array substrate **100**, so that it causes a problem that the thickness of the display apparatus is too large.

In addition, since the COF **200** is attached on the surface of the PCB **300** facing the array substrate **100**, wires of the surface are transverse wires, and wires of the surface of the PCB **300** away from the array substrate **100** are vertical wires (here, the wires perpendicular to the paper plane is called as vertical wire, and the wires perpendicular to the vertical wire and parallel to the circuit board is called as transverse wire). The vertical wires are mainly used to transfer signals between respective electronic components **301** of the PCB **300**, and the transverse wires are mainly used to connect the electronic components **301** to the bonding pins. In order to avoid the electronic components **301** on the PCB from being damaged, the electronic components **301** are generally disposed on a surface away from the array substrate **100**; however, in this way, it would compete in space with the vertical wires, causing difficulty in wiring.

SUMMARY

Embodiments of the present invention provide a display panel with a reduced frame width and a display apparatus having the display panel, which may solve at least one of the above existing technical problems.

According to one aspect of the present invention, there is provided a display panel, comprising: an array substrate, a printed circuit board (PCB), a chip on film (COF), wherein a chip is disposed on a first surface of the COF, and one end of the first surface is attached to a connection region of the array substrate, and the other end of the first surface is attached to the printed circuit board, and the first surface of the COF faces the array substrate, and the connection region is disposed at a side of the array substrate away from (i.e. opposite to) a light-emitting surface.

Since the first surface of the COF disposed with a chip of the present invention faces the array substrate (that is, the chip is disposed at an inner side of the COF), and one end of the first surface is connected with the connection region of the array substrate, and the other end of the first surface is connected with the printed circuit board, it does not need to be folded for connection, and the chip faces the array substrate, so that the width of the frame of the display apparatus may be reduced.

In an embodiment, the display panel may be an AMOLED display panel.

In an embodiment, the display panel may be an AMOLED display panel which emits light from its bottom.

In an embodiment, the printed circuit board may be disposed on a side of the array substrate away from the light-emitting surface.

In an embodiment, the COF may be attached to a surface of the printed circuit board away from the array substrate, and electronic components of the printed circuit board may be disposed on the surface of the printed circuit board.

In an embodiment, the wires on the surface of the printed circuit board facing the array substrate may be used to transfer signals between the electronic components of the printed circuit board.

An embodiment of the present invention further provides a display apparatus, comprising the above display panel.

According to the embodiments of the present invention, since the COF does not need to be folded, the frame of the display apparatus may be narrowed.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a schematic view illustrating an AMOLED display panel in the prior art;

FIG. **2** is a schematic view illustrating an AMOLED display panel of a first embodiment of the present invention;

FIG. **3** is a schematic view illustrating a modification of the embodiment illustrated in FIG. **2**; and

FIG. **4** is a schematic view illustrating an organic light emitting diode disposed on an array substrate.

DETAILED DESCRIPTION

To make the technical solutions of the present invention to be better understood by those skilled in the art, the